National Aeronautics and Space Administration
Ames Research Center
Moffett Field, California 94035-1000

Justification for Other than Full and Open Competition
[FAR 6.303-2(b)(1)]

Summary Information:

Initiating Office:	NASA Ames Research Center Aerothermodynamics Branch (TSA)
Purchase Request No.:	4200442015
Procurement Title:	ARC Jet Facility Characterization Test at Centro Italiano Ricerche Aerospaziali (CIRA) Scirocco Plasma Wind Tunnel
Total Estimated Value:	**FOIA Ex. 5**
Period of Performance:	18 Sep 2012 – 17 Sep 2013
Statutory Authority: [FAR 6.303-2(b)(4)]	10 USC 2304(c)(1), *Only One Responsible Source and No Other Supplies or Services Will Satisfy Agency Requirements*

This Justification for other than full and open competition has been prepared in accordance with the requirements of Federal Acquisition Regulation (FAR) 6.303 and NASA FAR Supplement (NFS) 1806.303.

Detailed Information:

A. Nature and/or description of the action being approved. [FAR 6.303-2(b)(2)]

NASA Ames Research Center (ARC) proposes to negotiate a sole source one year Firm Fixed Priced contract with Centro Italiano Ricerche Aerospaziali (CIRA) for the performance of a series of characterization tests in their large scale, state-of-the-art Scirocco arc jet facility. The results of the characterization tests will allow NASA to evaluate Scirocco's performance at operating conditions that are beyond NASA's present capability and to acquire insight into the advanced designs for Scirocco's plant infrastructure (flow path, power, cooling, and control). NASA will use the data and experience to reduce technical risks of NASA's own arc jet facility expansion efforts.

NASA currently conducts atmospheric entry heating tests of spacecraft heat shield materials at ARC and JSC. Heat shield technology development for future NASA-led exploration missions, such as Mars sample return, will require testing at conditions beyond the reach of NASA's facilities which date from the 1960s and 1970s. As a first step towards expanding NASA's arc jet test capabilities, the Scirocco facility characterization tests will provide NASA with insight into the advanced features of the CIRA's facility and valuable performance data over a wide range of conditions that are outside NASA's ability to achieve. NASA will use the data and experience to reduce technical risks of NASA's own arc jet facility expansion efforts needed to meet the test requirements for decades to come. In the end, the results will enable new heat shield material design and development approaches – at lower risk- for future missions by expansion of critical validation testing into more demanding entry heating environments.

B. Description of the supplies or services required to meet the agency's needs (including estimated value). [FAR 6.303-2(b)(3)]

NASA will obtain the following required services from CIRA:

- **Facility Background Information** CIRA shall deliver dimensioned drawings and schematics of Scirocco's plenum, 1150 mm exit dia. nozzle, test chamber, and diffuser. These will be used by NASA to simulate CIRA's operation for pre-test planning and post-test data analysis purposes.
- **Facility Characterization Test** CIRA shall conduct a two-phase facility characterization test in Scirocco. The first phase will demonstrate operation over a series of runs at increasing arc heater pressure approaching the facility's design maximum arc pressure of 16.7 bar. The second phase will demonstrate operation over a series of runs at increasing arc current approaching the facility's design maximum enthalpy of 45 MJ/kg.
- **Facility Test History Summary** CIRA shall provide a summary of all previous tests in Scirocco.

The cost of approximately $325,000 was estimated in response to prior discussions about the scope of the proposed activity and the number of days of occupancy in the Scirocco facility.

C. An identification of the statutory authority permitting other than full and open competition. [FAR 6.303-2(b)(4)]

The statutory authority for this procurement is 10 USC 2304(c)(1), *Only One Responsible Source and No Other Supplies or Services Will Satisfy Agency Requirements*.

D. Demonstration of the proposed contractor's unique qualification or the nature of the acquisition requires use of the authority cited. [FAR 6.303-2(b)(5)]

In accordance FAR 6.302-1(a)(2), "When the supplies or services required by the agency are available from only one responsible source, or, for DoD, NASA, and the Coast Guard, from only ore or a limited number of responsible sources, and no other type of supplies or services will satisfy agency requirements, full and open competition need not be provided for."

Further, in accordance with FAR 6.302-1(b), "Use of this authority may be appropriate . . . [w]hen there is a reasonable basis to conclude that the agency's minimum needs can only be satisfied by . . . . unique supplies or services available from only one or a limited number of sources or from only one or a limited number of suppliers with unique capabilities."

Large scale arc jet facilities are used for testing and evaluation of spacecraft heat shield materials that protect a spacecraft during entry into a planetary atmosphere. There are very few of these facilities operating in the world, including NASA's facilities. NASA seeks information from CIRA about the design, operation, and performance characteristics of facilities with operational capabilities that exceed those of NASA's aging arc jet facilities. NASA will use the information acquired from CIRA through this contract to develop strategies for upgrading and expanding NASA's arc jet facilities.

The Scirocco arc jet test facility is unique in the world. Completed in 2001, Scirocco is also the most modern of the world's large-scale arc jet facilities. Scirocco has advanced designs for the supporting subsystems (listed in the SOW and Test Plan) and is the only arc jet facility capable of operating at arc pressures as high as 16.7 bar and enthalpies as high as 45 MJ/kg. NASA's own facilities at ARC and JSC and the Boeing LCAT facility cannot match CIRA's extreme operating conditions. These conditions are necessary to evaluate heat shield materials for atmospheric entry vehicles returning from Mars or other deep-space destinations, which are part of NASA's long-term plan.

E. Description of efforts made to ensure that offers are solicited from as many potential sources as is practicable, including whether a notice was or will be publicized as required by FAR Subpart 5.2 and, if not, which exception under 5.202 applies. [FAR 6.303-2(b)(6)]

A synopsis was posted on 28 June 2012 on the NASA Acquisition Internet Service (NAIS) and the Federal Business Opportunities Portal (FedBizOpps) to inform the public and industry of NASA's intent to contract with CIRA. The synopsis closed on 13 July 2012; no responses were received as a result of the synopsis.

F. A determination by the Contracting Officer that the anticipated cost to the Government will be fair and reasonable. [FAR 6.303-2(b)(7)]

The Contracting Officer's signature on this document indicates that the Contracting Officer has determined that the anticipated cost to the Government will be fair and reasonable. CIRA will be requested to submit a proposal for the firm fixed price of the test services. Prior to execution of the contractual instrument, a proposal analysis will be performed in accordance with FAR 15.404. Proposal analysis will include cost and price evaluation techniques to ensure the final negotiated price is fair and reasonable.

G. Description of the market research conducted and the results or a statement of the reason market research was not conducted. [FAR 6.303-2(b)(8)]

A synopsis (NAA12ARCJET) was posted on 28 June 2012 on NAIS and FedBizOpps as stated in paragraph E, above. The synopsis closed on 13 July 2012; no responses were received as a result of the synopsis.

The Project Lead and COTR have extensive knowledge of the capability of large-scale arc jet facilities. They have determined that large-scale arc jet facilities, in or accessible to the U.S., are few in number. Worldwide, CIRA's Scirocco in Italy, NASA's facilities at ARC and JSC, and Boeing's LCAT facility are used for test and evaluation of atmospheric entry heat shield materials at the scale and flow conditions necessary for flight qualification. Each of these large scale facilities represents a significant capital investment for a limited user base – primarily national governments. No institution, private or public, other than CIRA's Scirocco has a large scale arc jet facility that can be used for this type of heat shield material testing. Of the existing, accessible facilities, only CIRA's Scirocco meets NASA's requirements for operating at conditions exceeding those of all other known, accessible facilities.

H. Any other facts supporting the use of other than full and open competition. [FAR 6.303-2(b)(9)]

The Project Lead and COTR have determined that only CIRA's Scirocco facility meets NASA's requirements for operating at conditions exceeding those of all other known accessible facilities and is highly qualified to provide the required test services.

A detailed description of Scirocco and its capabilities compared to other arc jet facilities can be found in the following reference:

G. Russo, F. De Filippis, S. Borelli, M. Marini and S. Carista, "The Scirocco 70-MW Plasma Wind Tunnel: A New Hypersonic Capability," in *Advanced Hypersonic Test Facilities*, American Institute of Aeronautics and Astronautics, F.K. Lu and D.E. Marren, eds. (2002).

I. Listing of the sources, if any, that expressed, in writing, an interest in the acquisition. [FAR 6.303-2(b)(10)]

See paragraph E. No sources, other than CIRA's Scirocco, have expressed an interest in the acquisition.

J. Statement of the actions, if any, the agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required. [FAR 6.303-2(b)(11)]

It is the intent of NASA to develop advanced capability within the agency to support future requirements for this testing. The information received as a result of this contract will facilitate NASA's effort to develop this capability.

Signature Page

Requirement Initiator:
Jay Grinstead
Aerospace Engineer

I certify that the facts presented in this justification are accurate and complete.

Signature Date

Contracting Officer:
Manuel Herrada

I hereby determine that the anticipated cost to the Government will be fair and reasonable and certify that this justification is accurate and complete to the best of my knowledge and belief. [FAR 6.303-2(b)(12)]

Signature Date

cc (after approval):
JAC Admin Asst: 241-1